
Lahontan Regional Water Quality Control Board

TO: Members of the Board
Advisory Team



FROM: Lauri Kemper, PE
Assistant Executive Officer

DATE: November 3, 2015

**SUBJECT: PROSECUTION TEAM'S RESPONSE TO OCTOBER 16, 2015
PROPOSED CLEANUP AND ABATEMENT ORDER FOR PG&E TO
CLEANUP CHROMIUM CONTAMINATION FROM ITS HINKLEY
COMPRESSOR STATION, SAN BERNARDINO COUNTY**

The Prosecution Team appreciates the collaborative process provided by the Water Board for this matter, in that it has provided several opportunities for valuable exchanges between all stakeholders in developing the proposed Cleanup and Abatement Order (CAO). This memorandum identifies the Prosecution Team's main points it will address at the subject November 4, 2015 hearing. Below are brief descriptions of our principal concerns, and the attached contains constructive, clarifying language for the Lahontan Water Board to consider in issuing the CAO and supporting comments for several key items.

Of highest priority is the new concept of relying upon well density that the Advisory Team added into the most recent proposed CAO in Finding 34.b) on page 10. The new language in the proposed CAO compares the amount of wells installed in the southern plume versus the northern area, setting a standard or minimum measure of monitoring wells that has never before been seen in the Lahontan Region. This well density concept to provide sufficient evidence to link the chromium in the northern areas to PG&E's discharge is unsupported and would set a precedent for cleanup orders in the Lahontan Region.

The Prosecution Team's analysis of this new standard is on page 6 of the attached comments, along with recommended changes to make this CAO more consistent with other Water Board orders. The Prosecution Team respectfully requests that the Board Members consider this analysis in its determination whether to include the well density standard, and notes that this is the first opportunity provided to the parties to comment on the proposed language.

The next main point the attached recommend language and comments address is the proposed plume mapping requirements. The Prosecution Team remains highly concerned that allowing PG&E to submit maps only requiring they use their best professional judgment in showing chromium isoconcentration contour lines will result in drastically different maps than those submitted since the requirements in CAO R6V-2008-0002A4 took effect. There is only an assumption that mapping isoconcentration contour lines will have a general appearance similar to the maps submitted since CAO R6V-2008-002A4 was issued, and no technical explanation for the reasoning behind the statement in the proposed CAO. Not only will this cause inconsistent plume mapping, but it will increase demand for staff time and resources in evaluating and using the submitted maps.

Since PG&E has not objected to continuing to submit maps consistent with the requirements in CAO R6V-2008-0002A4 when allowed to provide an inset map or separate map, the Prosecution Team requests to continue the practice. As PG&E described the matter on page 2 in their September 30, 2015 comments to the September 1, 2015 proposed CAO, "PG&E believes that depicting the data either on two different maps, or by using inserts, is useful for showing the public areas of agreement and disagreement in best professional judgment." Since the matter is not in contention, there is no need to make any changes to what has been successful for the parties and the community. You will find a lengthier analysis regarding plume mapping in the attached recommended language and comments on page 3.

The last main point of concern the Prosecution Team seeks to highlight for your attention is lower aquifer background levels. Evidence collected to date clearly supports background levels in the "localized area" of the lower aquifer are less than or equal to 0.2 parts per billion (ppb). There is no need to require an additional site conceptual model before setting cleanup background levels when we already have the needed data. Analysis of lower aquifer issues and recommended revisions are discussed starting on page 1 of the attached. The attached comments also contain recommendations for revisions to clarify language or correct typographical errors. For example,

- Correcting value for Lower Aquifer detection limit in the monitoring and reporting program section III.B (0.2 ppb, not 0.02)
- Clarifying matters around USGS background study data (who submits, who accepts, who establishes background concentrations)
- Adding monitoring well installation requirement at Acacia Street and updating monitoring frequency discussion to be consistent with consensus language
- Expanding on Dispute Resolution Process
- Other clarifications

Thank you for your consideration.

Attachment: Prosecution Team Comments on Proposed Cleanup and Abatement Order R6V-2015-Proposed, and Attachment 8, Monitoring and Reporting Program, released by Advisory Team on October 16, 2015

November 3, 2015 Prosecution Team Comments on Proposed Cleanup and Abatement Order R6V-2015-Proposed and Attachment 8 - Monitoring and Reporting Program, released by Advisory Team on October 16, 2015

I. Comments on Proposed Cleanup and Abatement Order (CAO) R6V-2015-Proposed

1. Advisory Team language added to CAO pages 2 and 3, Finding 8.

This finding adds language in a second paragraph regarding a “localized area,” the need to establish background concentrations, and develop a site conceptual model for the lower aquifer. Existing evidence in the record supports a decision at this time to set the background concentration at 0.2 ppb in the lower aquifer.

a. In Finding 8, update data and improve description of the “localized area”.

8. In the lower aquifer, chromium is detected up to levels exceeding the hexavalent chromium drinking water standard of 10 ppb (see Finding 28) in a localized area east of Mountain View Road and near Santa Fe Road. For example, the 2014~~5~~^{3rd} ~~2nd~~ Quarter Report shows lower aquifer monitoring well MW-400~~C~~ 92C containing ~~19.0~~ 26 ppb Cr(VI). The water quality in the lower aquifer water for chromium is generally at low (e.g. less than 1 ppb) or non-detectable levels, per monitoring wells MW-11C and MW-14C, between the Facility and east of Mountain View Road near Santa Fe Road. "Non-detect" refers to the lowest concentration that a laboratory analytical instrument can detect while minimizing uncertainty. According to PG&E's November 23, 2010, Work Plan for Evaluation of the Lower Aquifer, the chromium detected in this vicinity in the lower aquifer appears to be the result of contaminated upper aquifer water migrating into the lower aquifer in a localized area at the western edge of an aquitard (referred to as, 'the blue clay'). The downward migration appears to be a result of the observed downward gradient in the area, which likely extends beyond the edge of the aquitard. Consequently, contaminated water likely flowed from the upper aquifer to the lower aquifer in the localized area east of Mountain View Road and near Santa Fe Road. Later investigation and proposed remedial reports suggested the chromium migration pathway was via pathways within the thinning blue clay and/or around the blue clay edge near Mountain View Road (PG&E's August 1, 2011 Delineation of Chromium in Lower Aquifer; November 7, 2014 Plan for Enhancement of Lower Aquifer Remedy).

b. “Localized area” description

The definition of the “localized area” being a hydrogeologic localized zone between the lower aquifer and the overlying upper aquifer, and the need to establish separate background values is confusing. The zone between the two aquifers is the blue clay. The definition in the CAO should be revised to state the “localized area” is defined as a hydrogeologic localized zone representing the limited area in the lower aquifer subject to chromium migration from the upper aquifer.

c. Lower aquifer background levels are 0.2 ppb.

Evidence collected to date clearly supports background levels in the “localized area” of the lower aquifer are less than or equal to 0.2 parts per billion (ppb). The August 1, 2011 report submitted by PG&E concerning the lower aquifer investigation contained what amounted to a

site conceptual model. Figure 3 in the report (Attachment 1) shows a map where five monitoring wells (MW-23C, MW-28C, MW-42C, MW-92C, MW-100C) sufficiently define the extent of chromium out to 3.1 ppb Cr(VI) and 3.2 ppb Cr(T) in an area of less than one-half mile square. Subsequent monitoring reports submitted by PG&E since 2011 contain groundwater data indicating the lower aquifer background levels in the “localized area” are <0.2 ppb Cr(VI) and <1.0 ppb Cr(T). Four monitoring wells (MW-90C, MW-91C, MW-93C, MW-98C, and MW-99C) lie in the upgradient and cross gradient groundwater flow directions and within a quarter-mile of the drawn plume outline. Two upgradient monitoring wells (MW-91C and MW-93C) have shown non-detectable concentrations (to at least <0.2 ppb and <1.0 ppb) for Cr(VI) and Cr(T), respectively, since 2011. In addition, there is one more monitoring well (MW-98C) in the upgradient flow direction of the plume outline having 0.34 ppb Cr(VI) and non-detectable concentrations of Cr(T). This latter monitoring well is likely detecting chromium related to PG&E’s discharge since its location is both adjacent to the chromium plume outline and the western edge of the blue clay where chromium migration from the upper aquifer occurred. Thus, MW-98C is not considered a background monitoring well. The nine monitoring wells in the “localized area” [five within and four outside the chromium plume as seen in Figure 5-3 in the 2015 2nd Quarter Monitoring Report (Attachment 2)] comprise an area the size of less than a half-mile square.

There is no need to cause further delay by requiring an additional site conceptual model before setting cleanup background levels when we already have the needed data. The finding should be revised to remove the requirement for the site conceptual model.

Current PG&E remedial efforts have already resulted in achieving cleanup to non-detect concentrations at two monitoring well locations (MW-90C and MW-99C) in the lower aquifer. PG&E’s initial August 2011 lower aquifer investigation report cited up to 1.4 ppb chromium in these two monitoring wells. In 2012, PG&E implemented corrective actions to reduce the downward hydraulic gradient from the upper aquifer. The corrective action included replacing nearby agricultural and water supply wells screened across both aquifers with wells screened in just in the upper aquifer. Within five quarters, PG&E reached non-detect background concentrations in MW-90C and MW-99C. PG&E has performed remedial actions that have resulted in achieving chromium concentrations below detection limits indicating that it is reasonable and feasible to require cleanup in the lower aquifer to below detection limits.

Recommended language change to the second paragraph of finding 8, at page 3:

The lower aquifer is subject to different hydrogeological chemistry and is not expected to have the same Cr(VI) background concentrations as upper aquifer zones. Monitoring wells sampled during early investigations of the lower aquifer indicated non-detect concentrations of Cr(VI) upgradient of a localized area east of Mountain View Road and near Santa Fe Road (also referred to as the localized zone at the western edge of the lower aquifer). This information ~~suggests~~ supports the natural background concentrations of Cr(VI) in the lower aquifer upgradient of the “localized area” may be as non-detect. ~~The area upgradient of the “localized area” does not have direct hydraulic connection to the upper aquifer whereas the localized zone does. The “localized area” is in a hydrogeological localized zone between the lower aquifer and the overlying upper aquifer—representing the limited area in the lower aquifer subject to chromium migration from the upper aquifer. Consequently, Cr(VI) background concentrations in the “localized area” are likely influenced by both the lower aquifer and upper aquifer hydrogeological chemistry. The United States Geological Survey (USGS) Background~~

~~Study does not include an evaluation of the lower aquifer or “localized area” localized zone Cr(VI) background concentrations; therefore, before cleanup levels for the lower aquifer are established, the development of a site conceptual model and background concentrations are necessary. Of the nine monitoring wells in the localized area, four show non-detectable concentrations of Cr(VI) and Cr(T). The other five monitoring wells having detectable chromium concentrations are likely linked to PG&E’s discharge, due to their close proximity to the edge of the blue clay and being within the lower aquifer flowpath to two active agricultural wells called Ryken 8 and Ryken 9. Therefore, the background value for Cr(VI) and Cr(T) throughout the lower aquifer is non-detect or <0.2 ppb Cr(VI) and <1.0 ppb Cr(T).~~

2. Advisory Team language added to CAO page 3, Finding 9.

The Advisory Team has added language to this finding that the prior CAO (R6V-2008-0002A4) contained a plume mapping requirement to connect any monitoring wells within 2,600 feet of each other if their chromium concentrations exceed interim background levels; then removed the mapping requirement. The new language states that having PG&E map the chromium isoconcentration contour lines is expected to produce a map that is substantially similar to chromium plume maps in previous quarterly monitoring reports. The Advisory Team did not explain why it expects quarterly chromium plume monitoring maps to appear similar to previous plume maps after it removed the requirement.

PG&E has produced alternate maps under their best professional judgment in previous monitoring reports (either as Figure 5-5 since 2nd Quarter 2014 or Figure 5-6 before then) that show a smaller southern plume and absence of all northern plumes even though PG&E was required to connect monitoring wells within 2,600 feet. The latest proposed CAO language permits PG&E to resort back to such mapping under their best professional judgment (MRP Order III.B.2.g). Maps without the 2,600 feet connection requirement ignore significant and overwhelming data that indicate chromium concentrations exceeding interim background levels are more likely than not related to PG&E’s historical discharges, making them misleading. Since this proposed CAO allows PG&E to use best professional judgment to draw chromium plume maps (Attachment 8, III.b.2.g.), PG&E will likely produce maps in the future that are misleading and comparable to its previous alternate maps rather than comparable to chromium plume maps posted in the Water Board’s webpage. The Prosecution Team recommends keeping the 2,600 feet mapping requirements from CAO R6V-2008-0002A4 in this finding. Further information was provided in the Prosecution Team’s comments to the Advisory Team’s September 1, 2015 proposed CAO.¹

In its September 30, 2015 comments to the Advisory Team, PG&E states on Page 2 its willingness to continue drawing plume maps according to requirements in CAO R6V-2008-0002A4 if allowed to also provide inset maps or a separate map showing its alternate interpretation². Comments submitted by the Hinkley Community Advisory Committee and members of the public recommend continuing the plume mapping requirement in the 2013 CAO and oppose allowing PG&E to use best professional judgment as the sole basis for drawing plume maps. The Prosecution Team concurs with these community comments and finds that the 2013 CAO mapping requirements are the most reasonable and least controversial method to use in the proposed CAO until, and if, the USGS background study

¹ Those comments may be found here:

http://www.waterboards.ca.gov/lahtontan/water_issues/projects/pge/cao/docs/prosecution.pdf.

² September 30, 2015 Draft Cleanup and Abatement Order Comments, Page 2

results indicate the chromium in the northern areas are not linked to PG&E. With all parties in agreement to continue the current plume mapping requirement in place in the 2013 CAO, and also allow PG&E's inset maps, there is no reason for the Advisory Team to remove the requirement.

Recommended language change to the finding (other changes are needed in the order and monitoring and reporting program):

9. The locations of the upper aquifer plumes are based on Figure 5-5 of the 2014 3rd Quarter Report, and are shown in Attachment 2, "Location of Chromium Plumes (Third Quarter 2014)." PG&E has mapped the plumes, following specific requirements in CAO R6V-2008-0002A4, issued January 8, 2013, to connect any monitoring wells located within 2,600 feet of each other if their chromium concentrations exceed interim background levels. ~~Although that specific mapping requirement is being removed, the requirement in this order for PG&E to map chromium isoconcentration contour lines is expected to produce a map that is substantially similar to the quarterly report plume maps that have been generated since 2013.~~ These requirements are continued in this Order so that maps in the future can be compared to maps in the past to evaluate extent of contamination, chromium movement over time, and threats to supply wells. PG&E is allowed to provide inset maps showing alternate plume configurations it determines originates from historical releases.

3. Advisory Team language added to CAO page 7, Finding 20.

To provide consistency with above changes to Finding 9 regarding plume mapping, we offer the suggested modifications below.

Recommended language change:

20. Orders in CAO No. R6V-2008-0002A4, which was issued prior to the State of California setting the Cr(VI) drinking water standard at 10 ppb, required PG&E to define the extent of chromium in the upper aquifer using the ~~interim~~ maximum background levels. Order provision A.2.a required that monitoring well locations were not to exceed one-quarter mile distance (1,320 feet) from other monitoring wells in accessible areas. Order provision C.2 required that maps include chromium plume boundary lines drawn to connect any monitoring well located within one-half mile (2,600 feet) of any other monitoring well having chromium concentrations exceeding background levels, due to the large spacing between some monitoring well locations. PG&E used this plume boundary, among other reasons, to define who received offers for replacement water and property buyout. With the drinking water maximum contaminant level now set at 10 ppb for Cr(VI), prescriptive plume definition and mapping requirements are no longer needed, as PG&E no longer uses the plume map is not being used to determine who gets replacement water (See Findings 22, 42-45; note while PG&E has terminated its property purchase program.) Plume mapping requirements are still needed to determine the chromium extent in groundwater, provide comparative mapping of the contamination over time, evaluate chromium movement over time, and to determine threat to existing domestic wells. This Order requires ongoing investigation of groundwater, including retaining the requirement for a minimum well spacing of 1,320 feet or less for the southern plume area, to provide sufficient resolution of chromium concentrations. plume migration and to judge successful remediation, and it requires plume boundary mapping consistent with the industry standard of best professional judgment by a California-licensed Professional Geologist or Civil Engineer.

In written comments and public workshops, ~~However, because the community has expressed concerns that changing the mapping requirements may result in substantially different maps than it has become accustomed to. Therefore, this order continues the requirement for a minimum well spacing of 1,320 feet or less for the southern plume area is retained and the requirement~~ drawing chromium boundary lines on maps by connecting any monitoring well located within one-half mile (2,600 feet) of any other monitoring well have chromium concentrations exceeding background levels of to draw 3.1 ppb Cr(VI) and 3.2 ppb Cr(T) isoconcentration contour lines is included, which will result in the chromium concentrations being identified in ways that are substantially similar to what has been required in the past. This mapping requirement is consistent with other mapping requirements issued by the Water Board, such as in CAO R6V-2013-0045 which requires the City of Barstow to map the isoconcentration contour lines of nitrate in the groundwater. The mapping requirements in this order allow the community and the Water Board to be able to continue to track the northern chromium concentrations, ~~while not identifying those northern chromium concentrations as being from PG&E's historic discharge during the pendency of the USGS Background Study.~~

4. Advisory Team language added to CAO page 7, Finding 21.

This finding states that PG&E's inability to fully define the northern extent of chromium in groundwater in the northern areas is due to access issues on private property or endangered species habitat. The finding implies that if access is gained in the future, additional investigations should be conducted to comply with the prior CAO requirement.

The Prosecution Team recommends that the Advisory Team update the finding by adding after the last sentence that as PG&E continues to buy up properties or take permits are issued in endangered species habitat areas, right of entry to areas that were previously inaccessible may later become accessible in the future allowing for future investigations.

Recommended language change:

21. In response to requirements in CAO No. R6V-2008-0002A4, PG&E submitted the April 24, 2014 document, "Status Report for the Northern Areas." The document proposed to investigate chromium in groundwater in seven areas in the northern disputed plumes. Through 1st Quarter 2015, two areas had been investigated and a third area had two monitoring wells (MW-212S1 and MW-212S2) installed near Red Hill to support chromium plume boundary investigations. PG&E has claimed an inability to gain access to private properties and presence of endangered species habitat has prevented investigative activities in certain areas. However, as PG&E continues to buy properties and/or Department of Fish and Wildlife issues permits within endangered species habitat (expected in 2017), access status may change in the future, allowing further investigations where domestic wells are threatened.

5. Advisory Team language added to CAO page 10, Finding 34. b).

Language added to this finding puts forth that a certain number or density of monitoring wells is needed to provide sufficient evidence to link chromium in the northern areas with PG&E's discharge at the compressor station, specifically:

"For the northern disputed plumes, data from nearly 100 monitoring wells is used to define the extent of chromium in excess of the interim maximum background levels. The northern disputed plumes cover an area roughly 5 miles long and 1 mile wide, giving an average monitoring well density about **one well per twenty acres of land**. This well density is much less compared to the well density in the southern plume **and it does not give sufficient evidence for the Water Board to link with substantial certainty the chromium to PG&E's historical discharge at this time**" (emphasis added).

Although we understand that PG&E has disputed the source of chromium found in the northern areas, we disagree that the lack of well density provides insufficient evidence to link the chromium to PG&E's historical discharge. Many other facts and data can be combined with a low monitoring well density to provide sufficient evidence to order cleanup or replacement water. Water Code section 13304 gives water boards the authority to require a person who has threatened to cause or permit waste to be discharged, or deposited where it may discharge, or create a condition of pollution or nuisance to cleanup and abate the effects of the waste. State Water Resources Control Board Resolution No. 92-49 states that section 13304 "authorizes Regional Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions" (para. 4). Resolution 92-49 requires the Regional Water Boards to use any relevant evidence including historical activities, site characteristics, hydrologic and hydrogeologic information, poor management of materials or wastes, lack of documentation, physical evidence, reports and complaints. (Para. I.A.1-10.) In fact, Water Board staff expects background chromium concentrations to be established for this northern area without additional monitoring wells installed. Once background values are established for this area, the Water Board will infer that concentrations above 'natural background' levels in this area are from PG&E's historic discharges since there are no other likely anthropogenic sources in the area.

The Water Board has appropriately required cleanup of groundwater or replacement water to affected parties based on data from significantly fewer than 100 monitoring wells or lower monitoring well densities, including cases where **no** monitoring well data was available, using supply well data³ and/or visual observations (for example, a observing a waste manure pile adjacent to nitrate-polluted domestic wells).

The Advisory Team's assertions that data from 100 monitoring wells within a 20 monitoring well per acre density is not sufficient evidence to conclusively link contaminant concentrations in the north to PG&E's discharge is unsupported. Furthermore, putting forth this language sets an unintended precedent for the Water Board's current and future regulatory and enforcement activities.

Recommended language change:

- b) ~~For the northern disputed plumes, data from nearly 100 monitoring wells is used to define the extent of chromium in excess of the interim maximum background levels. The northern disputed plumes cover an area roughly 5 miles long and 1 mile wide, giving an average monitoring well density about one well per twenty acres of land. This well density is much~~

³ See for example, CAO R6V-2011-0058 and CAO R6V-2011-0059, requiring dairy owners to provide replacement water to residents based on supply well data. Available at http://www.waterboards.ca.gov/lafrontan/water_issues/projects/pge/cao/

~~less compared to the well density in the southern plume and it does not give sufficient evidence for the Water Board to link with substantial certainty the chromium to PG&E's historical discharge at this time. However, because the standard for requiring dischargers to submit technical or monitoring program reports as part of investigations of water quality under Water Code section 13267 is much less stringent than requirements for requiring clean-up under Water Code section 13304, Sufficient evidence exists for the Water Board to require PG&E to conduct investigations and monitoring of the northern disputed plumes. The USGS Background Study is intended to may provide sufficient evidence that can be used to determine how much or if chromium in the northern plumes is naturally-occurring and directly and unequivocally not linked to PG&E's historical discharge ~~or if it is naturally-occurring~~. Though the extent of chromium in excess of the ~~interim~~ maximum background levels is not as well defined in all areas of the northern disputed plumes, as compared to the southern plume, the highest chromium concentration in the north is roughly one-tenth of that in the south. As of 3rd Quarter 2014 monitoring results, ~~the high concentrations in the north have not affected and do not appear to threaten any existing domestic supply well~~ there are six domestic wells in the north having chromium concentrations in excess of the maximum background concentrations. According to PG&E, these domestic well owners have been provided reverse osmosis systems or refused such systems. Immediate health threat to the domestic well users has been abated, or voluntarily refused, pending the outcome of the USGS Background Study.~~

6. Advisory Team language added to CAO page 11, Finding 34 c.

Language added to this finding puts forth that limited data exists from current monitoring wells in the lower aquifer to characterize the localized zone and to conclude whether naturally-occurring Cr(VI) occurs in other parts of the lower aquifer.

For the extensive reasons provided in Comment 1 above, the Prosecution Team recommends removing the last sentence in this section, adding language describing remedial actions taken to date, and requiring further remedial actions needed to achieve cleanup to background levels. In addition, we understand the Advisory Team has proposed to correct the inaccurate detection limit in the second sentence from 0.02 ppb to less than 0.2 ppb (this correction should also be carried over to section III.B of the monitoring and reporting program, see comment II.2).

Recommended language change:

- c) For the lower aquifer, data from approximately 20 monitoring wells ~~is~~ are used to define ~~determine~~ the occurrence extent of chromium that is linked to PG&E's historical discharge. ~~These~~ Specifically, five monitoring wells indicate that Cr(VI) linked to PG&E's discharge has migrated into portions of the lower aquifer, called the "localized area," which have been shown to previously not contain Cr(VI) above a detection limit of less than 0.20 0.02 ppb. ~~However, limited data exists to characterize the localized zone from the upper aquifer to the lower aquifer and there is insufficient data to conclude whether naturally-occurring Cr(VI) occurs in other parts of the lower aquifer.~~ Since there are a sufficient number of monitoring wells to evaluate chromium extent in the lower aquifer and the background levels, further investigations are not needed. Starting in 2012, PG&E has conducted remedial actions to reduce chromium concentrations in the lower aquifer. This

Order sets requirements for PG&E to continue remedial actions to achieve cleanup to background concentrations of <0.2 ppb Cr(VI) and <1.0 ppb Cr(T).

7. CAO page 13, Finding 43.

Finding 43 describes requirements for submitting replacement water plans. However, the language is not consistent with the Order provision VII. A.2 a) at page 25, which states, "within 45 days of this Order being issued, PG&E must submit for the Water Board Executive Officer's acceptance a workplan outlining long-term replacement water supply for all drinking and cooking uses."

Recommended language change to finding 43:

However, consistent with the Olin Order, if future monitoring data indicate water in private supply wells within the domestic well sampling area defined in the "Groundwater Monitoring and Reporting Program, CAO No. R6V-2015-PROP", Attachment 8, exceed or are likely to exceed drinking water standards for Cr(VI) within one year and the detections are linked to PG&E's historical releases, this Order requires PG&E will be required to submit a workplans to provide outlining long-term replacement water supply options to such for affected wells (defined in finding 46), should any active private supply well later exceed the drinking water standard and become an affected well. The long-term replacement water workplan is required within 45 days of this Order being issued.

8. CAO page 17, Order provision IV.A.2.

The Advisory Team deleted the phrase "east of Summerset Road and Acacia Street" as an area having insufficient resolution to fully understand the occurrence of chromium in groundwater. This deletion means there is **now no requirement for PG&E to install a monitoring well in that area between MW-110S on Acacia Street and Summerset Road, where the gap between monitoring wells is over 2,700 feet, in violation of existing and proposed CAO requirements for the southern plume.**

According to a December 12, 2013 letter by the Water Board Executive Officer, chromium detections between Summerset Road and Dixie Road are assumed to be from PG&E's historical releases. The Prosecution Team recommends restoring the deleted language to specify that the area of east of Summerset Road and Acacia Street requires an additional monitoring well cluster to comply with existing and proposed CAO requirements that monitoring wells be no more than 1,320 feet apart. The restored language should be inserted into Order provision IV.A.1, for the southern plume.

Recommended language change:

2. As of the date this Order is issued, certain areas exist ~~in and around the northern disputed plumes~~ where there is little to no subsurface information about chromium concentrations in the groundwater and these areas exhibit insufficient resolution to fully understand the occurrence of chromium in the groundwater. These areas include: east of Summerset Road and on Acacia Street; eastern boundary for the Hinkley Valley northern disputed plume; northwest of MW-154S1, south and east of Well 33N-01, north and west of MW-196; and east and west of Hinkley Road starting at MW-161 and north to Grasshopper Road.

9. Advisory Team language added to CAO page 18, Order provision IV.A.3.iv.

This Order provision should clarify that any written technical information must be provided by the USGS.

Recommended language change:

iv. USGS Background Study – written technical information provided by the USGS such as the preliminary results report, or final report or other technical documentation containing analysis, interpretations and conclusions of chromium concentrations and sources of chromium.

10. CAO page 18, Order provision IV.B, second paragraph.

This Order provision requires PG&E to submit workplans proposing monitoring well locations to achieve sufficient resolution of the chromium plume in specific areas (listed in Order provision IV.A. 2), where access is allowed. The second paragraph addresses areas where access may be gained in the future, and allows PG&E to use best professional judgment to assess if additional wells are needed.

Recommended language change to second paragraph:

If submitting the workplan, then it must include proposed well designs and describe the method and manner of installation. If locations were considered but not chosen because they are inaccessible, explain why the area is inaccessible, and what PG&E has done to try to gain access.

[New paragraph] As access is gained over time, PG&E shall submit a workplan to install monitoring wells (for further plume definition) to the Water Board within 30 days of any change in land access status. Changes in land access status include, but are not limited to, being provided access to private property by the owner, acquisition of private property, and approval from agencies, such as Department of Fish and Wildlife, to lands that may be considered endangered species habitat or threatened species habitat. PG&E must use best professional judgment to assess if additional wells within those areas are necessary to define the plume boundary.

11. CAO page 19, Order provision V and V.A.2.

Order V defines plume containment and requires reporting for verifying plume containment.

The Prosecution Team requests an explicit order be added requiring PG&E to contain the southern chromium plume from migration.

Recommended language change:

V. Southern Plume Containment

PG&E shall take all actions necessary to contain the southern chromium plume from migrating to other locations.

12. CAO page 22, Order provision VI.C.1.a) iii.

This paragraph contains an incorrect reference to "USGS background concentrations", as explained in the Prosecution Team's September 30, 2015 comments. The original reference to "background values" in this order was intended to mean those values that are in effect when the USGS preliminary report is released in 2017. It is important to understand that the USGS will **not** set new background values. Rather, the USGS, in its final background study report, will propose background values for the Water Board to consider adopting.

Also, to further clarify what "acceptance of the USGS Background Study Preliminary Results Report" means, the Prosecution Team offers the following edits:

Recommended language change:

- iii. No later than 60 days following the Water Board contract manager's notification to PG&E of accepting the USGS Background Study Preliminary Results Report ~~by the Water Board~~, PG&E shall submit a technical report to the Water Board Executive Officer regarding the feasibility of achieving USGS background concentrations that are in effect at the time in the area of the western finger using the existing remedial activities, including an estimated cleanup timeframe if applicable. If additional remedial actions are required to achieve ~~USGS such~~-background levels, the technical report shall include a proposal to implement such activities. If at any time USGS provides written technical background study information such as the preliminary results report, final report or other technical document containing analysis, interpretation and conclusions demonstrating the chromium in the western finger is predominantly naturally occurring, no further remedial activities will be required in this area upon approval from the Water Board Executive Officer.

13. CAO page 22-23, Order provision VI.C.1.b) i-iii (Lower Aquifer).

This order directs PG&E to clean up and abate chromium concentrations in the lower aquifer. It adds requirements in subsections (ii) for submittal of a site conceptual model and proposed background concentrations, and in subsection (iii) for a feasibility assessment for cleanup to concentrations in the lower aquifer and the transition zone.

a. "Localized" and "Transition" Areas

The findings portion of the proposed CAO refers to the area of chromium contamination in the lower aquifer as the "localized area." Yet, the order portion refers to the same area as the "transition area." The Prosecution Team recommends using the same term in both the findings and orders of the proposed CAO.

b. Conceptual site model

A site conceptual model was previously submitted to the Water Board following PG&E's 2011 investigation of the lower aquifer. Since Water Board staff had no objection to the model submitted, there is no need to require one.

For the reasons provided above regarding Findings 8 and 34, the Water Board can set background values in the lower aquifer at non-detect for the localized area. PG&E has already

demonstrated it can remediate chromium to non-detectable concentrations in the localized area, achieved at MW-90C and MW-99C. As remedial actions in the lower aquifer continue with time and if non-detect concentrations cannot be achieved in all portions of the localized area, PG&E has the ability to propose alternate cleanup levels.

The Prosecution Team agrees with the requirement in subsection (iii) for P&GE to submit a feasibility assessment for the localized area, and suggests including an estimated cleanup time.

Recommended language change:

Delete Order provision VI.C.1.b) ii.
Revise subsection iii to be ii:

- iii. ~~ii. By June 15, 2016, Ssubmit a feasibility assessment for the remediation and cleanup to background concentrations in the transition-zone localized area at the western edge of the lower aquifer that includes an estimate cleanup time. within 90 days of Water Board acceptance of the conceptual site model and background report required under item ii, above.~~

14. CAO page 24, Order provision VI.C.2.d).

This Order provision requires PG&E to submit a feasibility assessment for remediation and cleanup to "USGS background concentrations" within 180 days of Water Board acceptance of USGS information that demonstrates the chromium in the Northern Plumes Area is predominantly from PG&E's historical discharge.

It is unclear how PG&E can implement this requirement. As noted above in comment 13, the USGS will **not** set background values. Rather, the USGS, in its final background study report, will propose background values for the Water Board to consider adopting. The Water Board may set cleanup levels that are the same or different from its adopted background values in the future. It seems premature to require a feasibility assessment to clean up to unknown future background levels, given the higher level of uncertainty regarding background in the northern area.

Recommended language change: Delete Order provision VI.C.2.d).

15. Advisory Team added language, CAO page 30, Order provision XIX, Dispute Resolution Process.

The language added to this section regarding dispute resolution is unclear, does not outline an actual process for dispute resolution (i.e., a step-wise process outlining responsible parties and timing of actions and follow up), and is inconsistent with dispute resolution processes established for other entities. For example, see the extensive, well thought-out processes described for CALFIRE and the Department of Defense⁴. It is unjust to the Parties, and other

⁴ George Air Force Base, Administrative Record #2107, Pages 27-32, section 12, Dispute Resolution; CALFIRE, State Water Board, and Regional Water Boards' MOU, Coordination and Conflict Resolution Process, section V, available at http://www.waterboards.ca.gov/lahtontan/water_issues/projects/pge/cao/

organizations working with the Water Board, to include a paragraph in this CAO as opposed to a full process. If the Water Board desires to have a dispute resolution process, it should resemble the intensive processes used in other matters, especially since this cleanup in Hinkley is quite complex.

For example, the existing language is not clear who submits the technical justifications; who reviews such submittals; and who would agree or disagree with the submittal, triggering a decision by the Water Board or its Executive Officer.

The Prosecution Team recommends deleting the section. If the Water Board desires a resolution process, it can be established outside of the proposed CAO in similar fashion with the CALFIRE and Department of Defense processes.

II. Comments on Attachment 8, Monitoring and Reporting Program

1. MRP page 3, section I. D. 1.

This section describes monitoring well sampling frequency and modifications in the northern plumes area.

Starting with the second sentence, it appears that language from the January 2015 MRP is still in place and should be deleted to clarify how monitoring frequency should be changed. The consensus monitoring frequency is described below in section 4 using the decision tree.

Recommended language change:

1. ~~Quarterly sampling~~ at all **single** monitoring wells and at **multi-depth** monitoring wells showing the **highest** hexavalent or total chromium detections greater than the interim maximum background levels as of 4th Quarter 2014. ~~If four consecutive or four out of five samples in different sampling periods detect chromium in monitoring wells at decreasing concentrations that puts the well into one of the below categories, the Discharger may decrease the sampling frequency accordingly. In this instance, the new well showing the highest chromium concentrations greater than the interim maximum background levels is then moved to a quarterly sampling frequency.~~

2. MRP page 7, section III.B. Groundwater Monitoring Reports

The value for non-detectable levels of hexavalent chromium in the lower aquifer is stated incorrectly. The laboratory detection limit required by the Water Board is 0.2 ppb, not 0.02 ppb. Sometimes, monitoring reports show laboratory detection limits as low as 0.06 ppb. However, since this cannot be consistently achieved with all samples, it has not been a requirement by the Water Board.

Recommended language change:

Using data from the monitoring wells, quarterly reports shall define the full lateral and vertical extent of chromium in groundwater, based on the monitoring information gathered pursuant to the MRP, for hexavalent and total chromium to at least the interim maximum background levels of 3.1 ppb and 3.2 ppb, respectively, in the upper aquifer, and to ~~0.02~~ 0.2 ppb Cr(VI) the lower

aquifer, and determine the direction of groundwater flow. At a minimum, quarterly monitoring reports shall contain the information listed below.

3. MRP page 9, section III. B. 2.g.iv.

This paragraph should clarify that any written technical information must be provided by the USGS.

Recommended language change:

- iv. USGS Background Study – written technical information provided by the USGS such as the preliminary results report, or final report or other technical documentation containing analysis, interpretations and conclusions of chromium concentrations and sources of chromium.

4. MRP page 11, section III. B. 2.g. Best Professional Judgment

This section describes using best professional judgment when drawing chromium plume lines on maps. See comments above justifying retaining the previous plume mapping requirements from CAO R6V-2008-0002-A4.

Public and the Prosecution Team comments submitted to the Advisory Team for the September 1, 2015 Draft CAO all stated the need to retain mapping requirements from CAO R6V-2008-0002A4 until after the USGS Background Study is completed. Even PG&E's comments stated a willingness to continue drawing maps as before (it is cleanup requirements in the northern area that PG&E objects to). The only way to achieve this is to remove the "best professional judgment" requirement in the proposed CAO and return to the requirement to draw chromium plume lines to connect any monitoring well located within one-half mile (2,600 feet) of any other monitoring well having chromium concentrations exceeding background concentration.

Recommended language change:

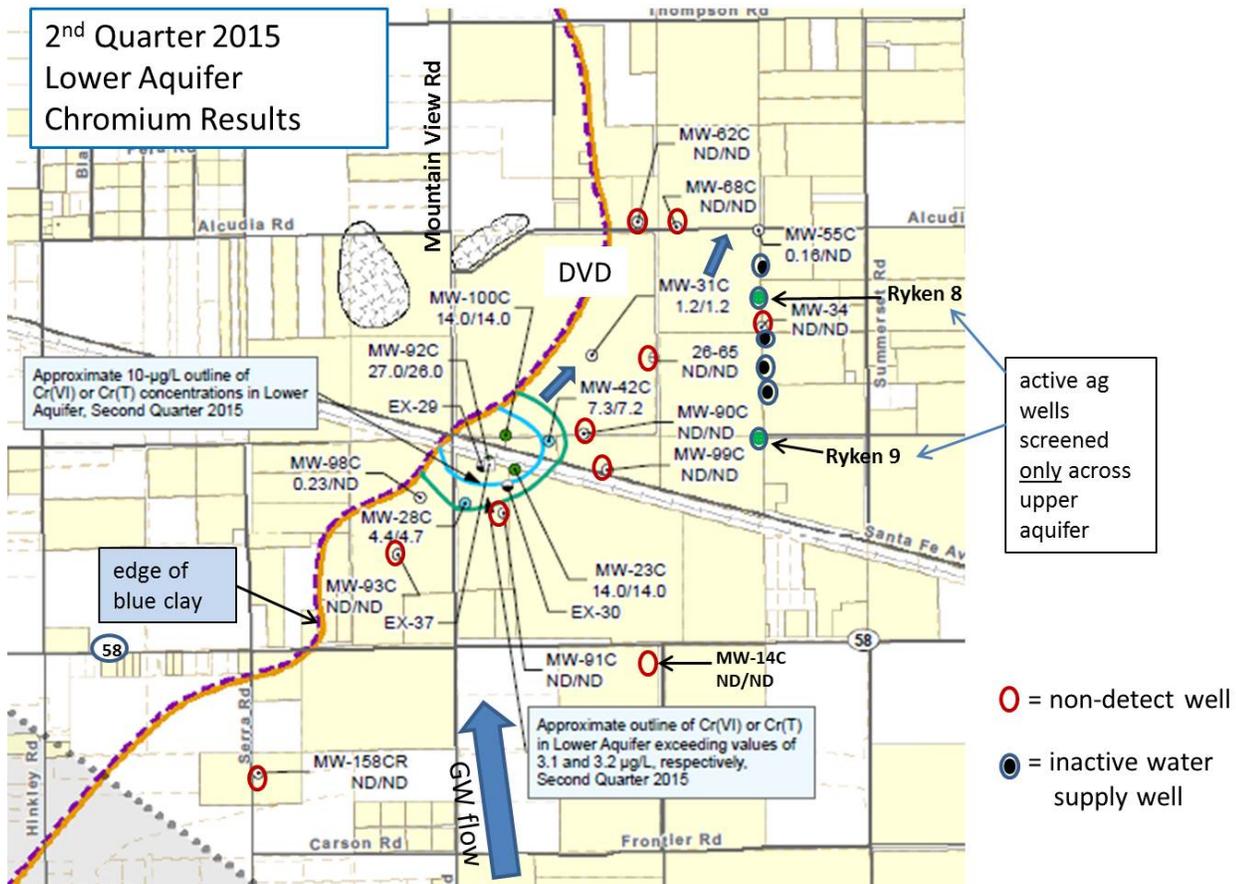
- g. Plume boundary lines shall be drawn to connect any monitoring well located within one-half mile (2,600 ft) of any other monitoring well having chromium concentrations of 3.1 ppb Cr(VI) or 3.2 ppb Cr(T) or greater.
~~Chromium isoconcentration contour lines shall be drawn by a California licensed Professional Geologist or Civil Engineer by evaluating and reporting the site specific conditions using best professional judgment considering the following factors, at a minimum:~~
 - i. ~~Geology—pertinent subsurface features such as location and depth to bedrock, influences of structure (e.g. folding and faulting), and stratigraphy.~~
 - ii. ~~Hydrogeology—location and hydraulic properties of the hydrostratigraphic units including, as appropriate, hydraulic conductivity, hydraulic gradients (e.g. horizontal and vertical, regional and localized due to groundwater extraction or injection), saturated aquifer thickness, groundwater flow velocities and directions, characteristics of confined, unconfined, and vadose zones.~~

- iii. ~~Geochemistry — nature and extent of chromium concentrations, pertinent groundwater chemistry, historical data from monitoring wells, and appropriate trend analyses.~~
- iv. ~~USGS background study — written technical information such as the preliminary results report, or final report or other technical documentation containing analysis, interpretations and conclusions of concentrations and sources of chromium.~~

Figures

1. Figure 5-3—Chromium Results for Lower Aquifer Groundwater
2. 2011 Lower Aquifer Investigation Results Map

Attachment 1: Figure 5-3—Chromium Results for Lower Aquifer Groundwater



Attachment 2: 2011 Lower Aquifer Investigation Results Map

